Major Projects Association

Managing High-technology and Innovative Projects:

an MPA seminar held at Templeton College, Oxford, in November 1999.

MPA events are confidential. They provide a forum where someone involved in a major project can tell it the way it was. This summary is available to both members and non-members, and care has been taken to ensure that its contents do not breach confidentiality. This account cannot, therefore, do full justice to the event, so members please read the full proceedings when you receive them. Best of all, members, come to the events. Non-members, think about joining!

Participants

Over 60 people participated at the seminar. The following organizations were represented: AEA Technology – Risk Solutions, Bechtel, Bovis Program Management, British Energy, British Telecom, Brown & Root Ltd, Costain Group plc, Deloitte & Touche, Freshfields, Kappa Consulting, KSP Development Ltd, Linklaters & Alliance, Lockheed Martin UK Government Systems Ltd, London Transport, MACE Ltd, Marconi Electronic Systems, Ministry of Defence, Mott MacDonald, National Air Traffic Services, National Audit Office, Ove Arup & Partners, PA Consulting Group, PowerGen UK Plc - Projects, PricewaterhouseCoopers, Railtrack – Thameslink 2000, Rolls-Royce Plc, Rover Group Ltd, Templeton College, WS Atkins Consultants Ltd, WSP Group Plc

High-technology projects are a stiff challenge to any project manager. The seminar highlighted the problems of these projects — the long lead times often needed to develop the technology, the risks of scope creep and the need for strong leadership — and looked at examples of current projects where good practice is clearly paying off.

Hard and Soft Failure

The seminar was introduced to the concept of hard failure that led to customer dissatisfaction and threatened overall project success; and could even lead to the project's cancellation. Examples of hard failures were: the cancelled London Stock Exchange's first attempt at automated share dealing, TAURUS; or the air traffic control project at Swanwick which had mitigated its risks by using an advanced automation system being developed in America, only to have the programme cancelled in the US some two or three years into the project; and the Passport Office's software, which was being engineered at the same time as its way of doing business was changing.

A soft failure, by contrast, was missing a minor objective, that normally does not jeopardize project delivery. The Merlin project had experienced a real challenge with the active dipping sonar where the task of installing the sonar in the aircraft left that part of the programme two years behind schedule, although, happily, the programme as a whole remains on track.

How Does One Avoid Such Failures?

Each speaker named his own list of critical success factors which fell into three categories: people, management, and the processes and tools used.

Who should be involved? The project team as well as the senior management, including commercial and financial management, and the end-users of the commissioning company/agency. Key decisions should always involve senior managers.

The project team must be led by a strong, visionary and imaginative leader able to establish clear objectives and good internal communications. Moreover a leader able to build and foster trust within the project team, as well as with the owners and suppliers. Positive relations with suppliers is essential. It is only in an environment of trust that honest reporting can happen, which is crucial to the success of the project. The leader must also be able to foresee problems. Problems of the type leading to soft failure were almost inevitable, it was felt, but by taking swift action hard failure could be avoided.

The project team should consist of skilled and highly effective people

New air traffic control system at Swanwick

Need for project: Air travellers were experiencing massive delays throughout Europe in the 1980s because the existing ATC system was significantly short of capacity to meet the rapid increase in demand.

The project: A new ATC centre was planned on a greenfield site at Swanwick with the aim of producing 40 per cent additional capacity. It was set up as a fixed price contract with a cost of £350 million. To mitigate technical and timescale risks, it was to be based on the advanced automation system (AAS) being developed in the US and was to maximize the use of commercial off-the-shelf products.

Problems experienced:

- The risk mitigation was invalidated when the AAS programme was cancelled some two or three years into the project. The effects were aggravated by insufficient contingency planning having been done to cope with this scenario.
- Other technical problems lay with the unexpected amount of re-work by doing development and procurement concurrently within the same fixed price contract regime.
- Limited understanding of the full implications of using commercial off-the-shelf products, especially regarding the in-service support aspects and ability to make future changes.
- On the commercial front during the life of the contract, the main contractor, IBM's Federal Systems, sold the business to Loral who in turn were taken over by Lockheed Martin.
- NATS, now a limited company, also had to consider the implications of only being able to make future capital investments through the use of private finance initiative mechanisms. Now, NATS is to become part of a public–private partnership.
- The project was sanctioned with a degree of optimism which underestimated the full complexity of how to integrate the new technology with older existing in-service systems while maintaining full operational service.
- Cultural issues related to managing people across a number of integrated project teams also arose.
- Slippage in operational date from 1996 to winter 2001/2.

at all levels. Continuity of personnel in the integrated team is important. Otherwise gremlins can develop, such as lack of trust, arrogance, complacency, ineffective communication and the inability to manage practical applications or IT. Watch too that the project manager's power is not undermined by commercial and financial interests.

Management

- Project definitions of any proposed system must be fed back to end-users to make sure requirements are met. This process should go through several iterations.
- The contract and the bidding process should be managed with great care. When analysing bids, be aware that the cheapest bid may not provide the best value for money. Deliverability and quality are important, as well as price. Make sure suppliers can continue to provide support as the project matures through its life cycle.
- The supply chain and the procurement process must be managed with knowledge and understanding of the people involved. It should be possible to attain continuous improvement by monitoring performance.
- Ensure that the project meets the defined requirements and is cost effective over the project's life cycle. Make sure the proposed system is complete, robust and realistic at every milestone before moving on. Only then move on to design, build and test. At each stage systems must be inspected to see that they are interpreted correctly, tested and validated/verified.
- If possible, operate new and old systems in parallel.
- Make sure there is enough redundancy in systems that involve safety.
- All stakeholders must be identified and managed.
- Risk and contingency management are vital. All risks must be identified and allocated to the party best able to manage them. Make sure end-users understand the risks of pushing development tools into operational before they are ready. Risk management should be a continuous process throughout the life cycle of the project.

Process and Tools

- Process is all important. The chairman of the seminar emphasized that many times. In the pre-production phase of a project's life cycle the feasibility studies must be adequate, leading to clear definition of requirements. It is all to easy to be over-optimistic on time and cost, to make sure that the project is approved. The right balance between innovation and proven technology must be struck. Scope creep should be avoided. Make sure the systems can evolve to meet the demands of the future, in terms of capacity and performance.
- Training: staff must know how to use the system.
- Finally, after the project is implemented, it must be reviewed and evaluated. *Learn the lessons of the past*!